

Guide to the *Ptychadena* (Amphibia: Ranidae) of the southern third of Africa

by

J. C. Poynton

(P.O.Box 1174, Pretoria)

SYNOPSIS

A key and diagnoses are given for the following species of *Ptychadena*: *subpunctata*, *oxyrhynchus*, *superciliaris*, *obscura*, *mascareniensis*, *porosissima*, *grandisonae*, *upembae*, *uzungwensis*, *ansorgei*, *bunoderma*, *taenioscelis*, *chrysogaster guibei*, *keilingi*, *perplicata*, *mossambica*, *floweri* and *frontalis*.

P. anchietae and *abyssinica* are considered to be synonyms of *superciliaris*, and *P. floweri* and *frontalis* are provisionally treated as a single taxon.

INTRODUCTION

Ptychadena Boulenger is a genus of essentially tropical frogs, resembling the genus *Rana* both morphologically and ecologically. The great amount of interspecific variation and poorly-defined species parameters suggests that this genus is in an active phase of evolution, but while this makes the genus particularly worthy of study, it confronts the field herpetologist with severe and discouraging taxonomic difficulties. This guide is written in the hope that it will give a clear enough taxonomic picture to encourage more intensive work on the genus.

The area covered in this paper is the part of Africa south of 8°S. A definite line of geographical demarcation cannot be drawn, and some species whose range might just extend south of 8°S are not included: the species treated here have at least a substantial part of their known range south of 8°S.

From a geographical point of view, the most interesting feature of this genus in southern Africa is the precipitous subtraction of species in north-eastern Natal, without there being any clearly apparent physical cause, and with at most only a very partial ecological replacement by the related non-tropical genus *Rana* (Poynton & Bass, in press). The heaviest concentration of species appears to be in the region of the Zambezi–Congo divide.

In this paper the name *superciliaris* Günther is used for material called *abyssinica* Peters by Guibé & Lamotte (e.g. 1960) and *anchietae* Bocage by myself. The adoption of *superciliaris* follows the usage of Schmidt & Inger (1959) for Katangan material. I had not favoured the use of this name for more southern material because this material tends to have more extensive webbing, less than two phalanges of the fourth toe normally being free, whereas two phalanges are free in Katangan and West African material (the type

locality being Sierra Leone). Zambian material, however, shows a degree of variation that makes it impossible to maintain this distinction. For example, a series of 21 specimens from Gwisho Hot Springs, Kafue Flats area, shows a complete range from one to two phalanges of the fourth toe free.

P. floweri and *frontalis* are treated as a single taxon in this paper. When describing *frontalis*, Laurent (1954) noted the close similarity between this species and *floweri* Boulenger, and without giving a definite diagnosis distinguished them in a seemingly qualified way on the basis of the pectoral girdle. Schmidt & Inger (1959) confirmed the difference in pectoral girdles (although not stating what specimens of *floweri* had been examined), and reported a further difference in that the opening of the gular pouch is oblique to the mandible in *frontalis* and parallel in *floweri*. The material I have examined presents a degree of variation that makes it impossible from a practical point of view to make a workable diagnosis. A specimen from Boror, Mozambique, has intermediate gular pouch slits, and another specimen from Lake Peccatoni, Kenya, has a parallel slit on one side and an oblique slit on the other! The clavicle shows such variation in development that a point is reached where it is impossible to say definitely whether it is present or not (notably in a specimen collected south of Lake Tanganyika). This appears to be a case where an osteological feature varies to the extent of being valueless as a taxonomic character.

In an earlier key (1964a), I diagnosed *floweri* as having 'no definite outer metatarsal tubercle'. More recently collected Mozambique material shows that this feature can vary to the extent of the tubercle being distinct on one foot but absent on the other foot of the same specimen. Consequently it is not possible to use this feature to distinguish *floweri* from *frontalis*, which according to Schmidt & Inger always has this tubercle in Katanga. In view of this apparently merging variation, *floweri* and *frontalis* are here treated together, although more material from the intermediate Tanganyika-Malawi area is needed before a proper taxonomic assessment of the variation and its significance can be made.

As this paper is in the nature of a guide, references in the following diagnoses are limited to works in which the particular species is illustrated. However, full references and synonymies are to be found in the works referred to.

I am grateful to Dr D. G. Broadley for making available to me the large amount of *Ptychadena* material recently assembled in the Umtali Museum. Most of the work preparing this paper was carried out in the Transvaal Museum, and I am grateful to Dr C. K. Brain and Mr W. Haacke for their assistance.

KEY

Notes. Interspecific variation makes a concise and workable key impossible, but it is hoped that this 'breakdown' of the genus in southern Africa will prove to be more helpful than misleading. In all keys to this genus, much has to be made of the degree of webbing, but this has turned out to be a very variable feature, and desiccation of the toes (which commonly occurs in preserved material) causes a marked apparent reduction in webbing. Consequently this character has to be treated with caution.

Markings on the posterior face of the thigh are also used as diagnostic features in this genus. In the present key a distinction is made between species with a striped and spotted pattern (couplet seven), although in practice a clear distinction cannot always be

made. Borderline specimens are most likely to be found in *upembae*, *grandisonae* and *uzungwensis*, and the following diagnoses should be particularly carefully considered in these species.

In this key, *mossambica* (a particularly variable species) is separated on the relative shortness of the foot. This is a reasonably reliable character, but in some specimens (especially in the eastern and northern part of the range) the length of the foot may be decidedly greater than half the length of the body, and such a specimen would most likely key out as *guibei*. A cautionary note is included in the respective diagnoses that follow.

1. At least 2 dark bands running below vent from knee to knee . . . **subpunctata** (p. 368)
One or no bands running transversely below vent 2
2. A uniformly light triangular patch with definite base extending from eye to eye, apex at snout tip; webbing typically extensive, last phalanx of fifth toe webbed (in some cases web barely or not reaching it), less than 2 phalanges of fourth toe free of web (in some cases web barely or not reaching penultimate phalanx) 3
No uniformly light triangular patch on snout (if frontal area lighter, the light colouration extends posteriorly as a vertebral band); webbing typically not extending to last phalanx of fifth toe or penultimate phalanx of fourth toe 5
3. Snout strongly projecting, distance from nostril to tip of snout greater than internarial distance; posterior face of thigh profusely mottled **oxyrhynchus** (p. 368)
Distance from nostril to tip of snout not more than internarial distance; posterior face of thigh either with clearly contrasting light and dark longitudinal stripes or virtually unmarked, possessing a few indistinct light spots or lines 4
4. Posterior face of thigh with clearly contrasting light and dark longitudinal stripes; no row of tubercles under fourth metatarsus **superciliaris** (p. 369)
Posterior face of thigh with a few indistinct light spots or interrupted lines, no darker longitudinal bands; a row of tubercles under fourth metatarsus **obscura** (p. 369)
5. Two (rarely up to $2\frac{1}{2}$) phalanges of fourth toe free of web **mascareniensis** (p. 369)
More than $2\frac{1}{2}$ phalanges of fourth toe free 6
6. Length of foot (including metatarsal tubercle) more than half body length (see notes above) 7
Length of foot not more than half body length 16
7. Posterior face of thigh spotted or mottled, not possessing continuous longitudinal bands along whole length of thigh (see notes above) 8
Posterior face of thigh with clearly contrasted, continuous light and dark longitudinal bands 12
8. Light line running along length of upper surface of tibia **porosissima** (p. 370)
No light longitudinal line on upper surface of tibia 9
9. Three phalanges of fourth toe free of web 10
More than 3 phalanges of fourth toe free of web 11
10. Snout without skin ridges **grandisonae** (p. 370)
A pair of skin ridges on snout, each ridge marked by a dark patch **uzungwensis** (p. 371)
11. Dorsal skin folds evenly developed and none particularly prominent **ansorgei** (p. 371)
Paravertebral pair of skin folds particularly well developed **bunoderma** (p. 372)

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|-----|--|------------------------------------|
| 12. | Prominent, continuous dark band running transversely almost from knee to knee below vent | taenioscelis (p. 372) |
| | No continuous dark band running transversely below vent | 13 |
| 13. | Mid-dorsal pair of skin folds interrupted or present only posteriorly | guibei (p. 372) |
| | Mid-dorsal pair of skin folds continuous from occiput to vent | 14 |
| 14. | Three phalanges of fourth toe free of web | 15 |
| | At least $3\frac{1}{2}$ phalanges of fourth toe free of web | keilingi (p. 373) |
| 15. | Prominent glandular folds running along length of tibia, thigh folds continuous with folds on body | perplicata (p. 373) |
| | No continuous folds running length of tibia and thigh | upembae (p. 370) |
| 16. | At least 1 phalanx of fifth toe free of web | mossambica (p. 373) |
| | Less than 1 phalanx of fifth toe free | floweri, frontalis (p. 374) |

DIAGNOSES

1. *Ptychadena subpunctata* (Bocage)

Rana subpunctata Bocage, 1866, *J. Acad. Sci. Lisboa*, 1: 73: Duque de Bragança, Angola. Schmidt & Inger, 1959: 102, figs. 23, 46, pl. V.

Ptychadena subpunctata (Bocage), Poynton, 1964a: 127, fig. 66.

Distance from nostril to snout tip greater than internarial distance, equal to less than distance from nostril to eye. Gular pouch slits oblique to mandible. No outer metatarsal tubercle, no row of tubercles under fourth metatarsal. $1\frac{1}{2}$ to 2 phalanges of fourth toe free of web, less than one phalanx of fifth free. Length of foot subequal to, to greater than, length of tibia.

Top of snout lighter, forming a clearly defined triangular patch, or continuing as a light vertebral band. Light longitudinal line present on upper surface of tibia and usually on thigh. Posterior face of thigh with strongly contrasting light and dark longitudinal stripes, and at least 2 dark bands running from knee to knee below vent. Lower jaw heavily marbled. Ventral surface speckled with brown, rarely immaculate.

Range. Northern Botswana, Caprivi area, western Zambia, Angola, Katanga.

2. *Ptychadena oxyrhynchus* (Smith)

Rana oxyrhynchus Smith, 1849, *Illus. Zool. S. Afr., Rept.*: pl. 77: 'kaffirland and the region of Port Natal'. Schmidt & Inger, 1959: 91, figs. 43, 44.

Ptychadena oxyrhynchus (Smith), Guibé & Lamotte, 1961: 380, fig. 1; Poynton, 1964a: 124, fig. 64; Wager, 1965: 155; Stewart, 1967: 66, fig. 25.

Distance from nostril to snout tip greater than internarial distance, equal to greater than distance from nostril to eye (tip liable to get compressed in preserved material). Gular pouch slits oblique to mandible. No outer metatarsal tubercle, no row of tubercles under fourth metatarsal. $1\frac{1}{2}$ to 2 phalanges of fourth toe free of web, less than one phalanx of fifth toe free. Length of foot less than length of tibia.

Top of snout lighter, forming a clearly defined triangular patch. No light vertebral band, no light line on upper surface of tibia. Posterior face of thigh mottled, light markings not tending to form continuous longitudinal bands. Jaw heavily marbled along entire length to continuously darkened.

Range. Pondoland, Natal lowlands, eastern and northern Transvaal, Mozambique, Rhodesia, Angola and savannah areas to the north.

3. *Ptychadena superciliaris* (Günther)

Rana superciliaris Günther, 1848, *Cat. Batr. Sal. Brit. Mus.*: 17 & 132, pl. 1, fig. 11: Sierra Leone. Schmidt & Inger, 1959: 105, fig. 47.

Rana anchietae Bocage, 1867, *Proc. zool. Soc. Lond.*: 843, fig. 1: Benguella, Angola.

Rana abyssinica Peters, 1881, *Sber. Ges. Naturf. Freunde Berlin*: 163: Ailet, Eritrea.

Ptychadena abyssinica (Peters), Guibé & Lamotte, 1961: 384, figs. 2, 3.

Ptychadena anchietae (Bocage), Poynton, 1964a: 126, fig. 65; Wager, 1965: 157; Stewart, 1967: 68, fig. 26.

The taxonomy of this species is discussed in the Introduction.

Distance from nostril to snout tip subequal to internarial distance, less than distance from nostril to eye. Gular pouch slits oblique to mandible. Outer metatarsal tubercle sometimes feebly developed, no row of tubercles under fourth metatarsal. $1\frac{1}{2}$ to 2 phalanges of fourth toe free of web, less than one phalanx of fifth toe free. Length of foot less than length of tibia.

Top of snout lighter, forming a clearly defined triangular patch. No light vertebral band, no light line on upper surface of tibia. Light markings on posterior face of thigh forming longitudinal bands, and with heavy dark bordering. Lower jaw marbled to continuously darkened.

Range. Eastern Natal, Swaziland, Mozambique, eastern and northern Transvaal, eastern Botswana, Rhodesia, Caprivi area, Angola and savannah areas to the north across the breadth of the continent.

4. *Ptychadena obscura* (Schmidt & Inger)

Rana obscura Schmidt & Inger, 1959, *Explor. Parc Nat. Upemba*, 56: 85, figs. 41, 42: Parc National de l'Upemba, Katanga.

Distance from nostril to snout tip approximately equal to internarial distance, less than distance from nostril to eye. Gular pouch slits oblique to mandible. Outer metatarsal tubercle usually feebly developed, row of tubercles present under fourth metatarsal. 2 to 3 phalanges of fourth toe free of web, half to 1 phalanx of fifth toe free. Length of foot less than length of tibia.

Top of snout lighter, forming a clearly defined triangular patch. No light vertebral band, no light line on upper surface of tibia. Posterior face of thigh with a few indistinct light spots or interrupted lines, no longitudinal darker lines or bands. Lower jaw continuously or almost continuously darkened.

Range. Katanga, northern Zambia.

5. *Ptychadena mascareniensis mascareniensis* (Duméril & Bibron)

Rana mascareniensis Duméril & Bibron, 1841, *Erpét. Gén.*, 8: 350: Madagascar. Schmidt & Inger, 1959: 76, fig. 25, 39, 40.

Ptychadena mascareniensis mascareniensis (Duméril & Bibron), Poynton, 1964a: 128, fig. 67; Wager, 1965: 159; Stewart, 1967: 71, fig. 27.

Distance from nostril to snout tip equal to, or slightly more than, internarial distance, equal to distance from nostril to eye. Gular pouch slits parallel to mandible. No outer metatarsal tubercle, no row of tubercles under fourth metatarsal. 2 to (rarely) $2\frac{1}{2}$ phalanges

of fourth toe free of web, $\frac{1}{2}$ to 1 phalanx of fifth toe free. Length of foot equal to, to greater than, length of tibia.

Typically a light mid-dorsal band running from snout to vent, sometimes replaced by a thin line or more rarely absent. Longitudinal light line present on upper surface of tibia. Posterior face of thigh with somewhat irregular light longitudinal bands and contrasting dark bands. Lower jaw marbled.

Range. Mozambique plain, middle Zambezi and Okavango systems, and apparently all savannah areas to the north.

6. *Ptychadena porosissima* (Steindachner)

Rana porosissima Steindachner, 1867, *Reise Novara, Amph.*: 18, pl. 1, figs. 9–13: Angola. Schmidt & Inger, 1959: 96, fig. 45.

Ptychadena poyntoni Guibé, 1960? *Bull. Mus. Hist. nat. Paris* (2), 32: 200, fig. 1: Inhluwane, Natal.

Ptychadena porosissima (Steindachner), Poynton, 1964a: 129, fig. 68; Wager, 1965: 158; Stewart, 1967: 74, fig. 28, pl. 5.

Distance from nostril to snout tip equal to internarial distance, equal to, to slightly greater than distance from nostril to eye. Gular pouch slits oblique to mandible. Outer metatarsal tubercle absent to feebly developed, a row of tubercles under fourth metatarsal sometimes present. 3 phalanges of fourth toe free of web, 1 to $1\frac{1}{2}$ phalanges of fifth toe free. Length of foot slightly less than length of tibia.

Light dorsal line or band present from tip of snout to vent. Light longitudinal line present on upper surface of tibia. Posterior face of thigh usually with distinct light spots, but tending to be indistinct in Natal and the Cape. Lower jaw marbled, tending to be uniformly darkened in northern material.

Range. Eastern Cape, Natal, eastern and northern Transvaal, Mozambique, Rhodesia, Angola, Zambia, Katanga, Malawi, Tanganyika, Uganda.

7. *Ptychadena grandisonae* Laurent

Ptychadena grandisonae Laurent, 1954, *Ann. Mus. Roy. Congo Belge*, 34: 11, pl. 1, figs. 2, 5, pl. 3, figs. 1, 2, pl. 4, figs. 1, 9: Muita, Angola.

Rana grandisonae (Laurent), Schmidt & Inger, 1959: 70, figs. 36, 37.

Distance from nostril to tip of snout more or less equal to internarial distance and distance from nostril to eye. Gular pouch slits oblique to mandible. Outer metatarsal tubercle present, a row of tubercles under fourth metatarsus present but sometimes weakly developed. 3 (sometimes slightly less) phalanges of fourth toe free of web, 1 to $1\frac{1}{2}$ phalanges of fifth toe free. Length of foot very slightly less than length of tibia.

Light dorsal line or band usually present from snout to vent. No light longitudinal line on tibia. Posterior face of thigh with longitudinal series of light spots or short bands. Lower jaw marbled.

Range. North-eastern Angola, Katanga and environs of Lake Tanganyika.

8. *Ptychadena upembae* (Schmidt & Inger)

Rana upembae Schmidt & Inger, 1959, *Explor. Parc Nat. Upemba*, 56: 111, fig. 50: Parc National de l'Upemba.

Ptychadena upembae (Schmidt & Inger), Stewart, 1967: 76, fig. 29.

Ptychadena upembae machadoi Laurent, 1964, *Publ. Cult. Comp. Diam. Angola*, 67: 134: Alto Chicapa, Angola.

Laurent's *machadoi* is discussed in Poynton, 1964b. More recently collected material accords with the suggestion of an east-west cline in this species.

Distance from nostril to snout tip more or less equal to internarial distance and distance from nostril to eye. Gular pouch slits oblique to mandible. Outer metatarsal tubercle and row of tubercles on fourth metatarsal usually present. 3 phalanges of fourth toe free of web, 1 to $1\frac{1}{2}$ phalanges of fifth toe free. Length of foot slightly less than length of tibia.

Light vertebral line or band usually present. No light line on upper surface of tibia. Posterior face of thigh of at least one leg with at least one continuous light band running entire length, bordered usually on both sides by a continuous dark band (although on other leg the light band may be interrupted in several places). Lower jaw uniformly darkened. This species is very similar to *grandisonae*, from which it can be separated reasonably well by the thigh and—more especially—the jaw markings.

Range. North-eastern Angola, Katanga, northern and western Zambia, Malawi, northern Mozambique.

9. *Ptychadena uzungwensis* (Loveridge)

Rana mascareniensis uzungwensis Loveridge, 1932, *Bull. Mus. comp. Zool. Harvard*, **72**: 384: Dabaga, Tanganyika.

Ptychadena uzungwensis (Loveridge), Laurent, 1954: 9, pl. 1, fig. 1, pl. 4, fig. 4; Poynton, 1964a: 131, fig. 69; Stewart, 1967: 77, fig. 30, 31.

Rana uzungwensis Loveridge, Schmidt & Inger, 1959: 117, figs. 29, 51, 52.

Distance from nostril to snout tip slightly greater than internarial distance, equal to, to greater than, distance from nostril to eye. Gular pouch slits oblique to mandible. Outer metatarsal tubercle usually absent, sometimes present as a feeble bump, row of tubercles under fourth metatarsal usually present, but sometimes very weakly developed. 3 phalanges of fourth toe free of web, 1 to 2 phalanges of fifth toe free. Length of foot slightly less than length of tibia.

A pair of short skin folds anterior to upper eyelids, converging towards snout and usually continuous with a paravertebral pair of folds, overlain by darker skin. A light dorsal line usually passing from snout tip to vent. No light line on upper surface of tibia. Posterior face of thigh with light spots, not forming continuous light bands. Lower jaw marbled.

Range. Rhodesian and Mozambique uplands, Malawi, Zambia, Angola, Katanga, Tanganyika, Ruanda.

10. *Ptychadena ansorgei* (Boulenger)

Rana ansorgei Boulenger, 1905, *Ann. Mag. nat. Hist.* (7), **16**: 107, pl. 4, fig. 1: between Benguella and Bihé, Angola. Schmidt & Inger, 1959: 61, figs. 30, 32.

Distance from nostril to snout more or less equal to internarial distance and distance from nostril to eye. Gular pouch slits oblique to mandible. Outer metatarsal tubercle usually absent, with or without a row of tubercles under fourth metatarsal. $3\frac{1}{4}$ to $3\frac{1}{2}$ phalanges of fourth toe free of web, 2 phalanges of fifth toe free. Length of foot equal to more than length of tibia.

Light mid-dorsal line usually present, occasionally a light band. No light line on upper

surface of tibia. Posterior face of thigh with light spots, usually arranged in longitudinal rows. Lower jaw with continuous dark band.

Range. Angola, Katanga and environs of Lake Tanganyika.

11. *Ptychadena bunoderma* (Boulenger)

Rana bunoderma Boulenger, 1907, *Ann. Mag. nat. Hist.* (7), **9**: 214: Caconda, Angola.
Rana (Ptychadena) buneli Monard, 1937, *Bull. Soc. Neuch. Sci. Nat.*, **62**: 55, figs. 17, 18.
Ptychadena bunoderma (Boulenger), Laurent, 1964: 143, fig. 38.

Distance from nostril to snout tip less than internarial distance and distance from nostril to eye. $3\frac{1}{3}$ to 4 phalanges of fourth toe free of web, 2 to 3 phalanges of fifth toe free. Length of foot approximately equal to length of tibia.

Skin folds, especially paravertebral pair, strongly developed. Light vertebral band sometimes present. No light line on upper surface of tibia. Posterior face of thigh with dense scattering of small light spots.

Range. Angola.

12. *Ptychadena taenioscelis* Laurent

Ptychadena taenioscelis Laurent, 1954, *Ann. Mus. Roy. Congo Belge*, **34**: 25, pl. 4, fig. 6, p. 5, fig. 1: Lukula, eastern Congo; Poynton, 1964a: 132, fig. 70; Wager, 1965: 160; Stewart, 1967: 81, fig. 32.
Rana taenioscelis (Laurent), Schmidt & Inger, 1959: 109, fig. 49.
Ptychadena smithi Guibé, 1960, *Bull. Mus. Hist. nat. Paris* (2), **32**: 202, fig. 2: Mseleni, Zululand.

Distance from nostril to snout tip greater than internarial distance, equal to slightly less than distance from nostril to eye. Gular pouch openings oblique to almost parallel to mandible. Outer metatarsal tubercle absent to feebly developed, no row of tubercles under fourth metatarsal. 3 phalanges of fourth toe free of web, 1 to almost 2 phalanges of fifth toe free. Length of foot slightly greater than length of tibia.

Pair of dorsal skin folds passing onto snout in most northern, but in a minority of southern, specimens, and overlain by darker skin. A light vertebral line or band sometimes present in northern specimens. No light line on upper surface of tibia. Posterior face of thigh with conspicuous light and dark longitudinal banding, one dark band running transversely below vent almost from knee to knee. Lower jaw heavily marbled and throat usually spotted.

Range. North-eastern Natal, Mozambique, Rhodesia, Caprivi area, Angola and savannah areas across the continent to the north.

13. *Ptychadena chrysogaster guibei* Laurent

Ptychadena chrysogaster guibei Laurent, 1954, *Ann. Mus. Roy. Congo Belge*, **34**: 23; Poynton, 1964a: 133, fig. 71; Stewart, 1967: 83, fig. 33.
Rana chrysogaster guibei (Laurent), Schmidt & Inger, 1959: 65, figs. 26, 33.

Distance from nostril to snout tip less than internarial distance, less than distance from nostril to eye. Gular pouch openings oblique to mandible. Outer metatarsal tubercle present, row of tubercles usually present under fourth metatarsal. 3 to $3\frac{1}{2}$ phalanges of fourth toe free of web, $1\frac{1}{2}$ to 2 phalanges of fifth toe free. Length of foot equal to or greater than length of tibia.

Paravertebral folds typically not reaching tip of urostyle: a more medially placed para-urostyler pair continues to vent. In some specimens the right or—more usually—left urostylar fold is continuous with the vertebral fold of its side.

Light dorsal band present from snout tip to vent. Longitudinal light line on upper surface of tibia present or absent. Posterior face of thigh with regular longitudinal light and dark bands. Lower jaw with almost continuous dark shading.

Note. Some specimens of *mossambica* might key out to this species. As does the very similar *taenioscelis*, *mossambica* differs from *guibei* in the barring of the lower jaw, and *mossambica* also has irregular thigh bands.

Range. Mozambique, Malawi, Katanga, Angola.

14. *Ptychadena keilingi* (Monard)

Rana (*Ptychadena*) *keilingi* Monard, 1937, *Bull. Soc. Neuch. Sci. nat.*, **62**: 53, figs. 14–16: Dala, Angola.
Ptychadena keilingi (Monard), Laurent: 141, fig. 37.

Distance from nostril to snout tip equal to internarial distance, markedly less than distance from nostril to eye. Outer metatarsal tubercle usually weakly developed, row of tubercles present under fourth metatarsal. $3\frac{3}{8}$ to 4 phalanges of fourth toe free of main webbing, $2\frac{1}{2}$ to almost 3 phalanges of fifth toe free. Length of foot slightly greater than length of tibia.

Light dorsal band present from snout to vent. Light line usually present on upper surface of tibia. Posterior face of thigh with irregular light and dark longitudinal banding. Lower jaw continuously darkened, but sometimes containing a few light spots. Throat and chest spotted.

Range. Angola and western Zambia.

15. *Ptychadena perplicata* Laurent

Ptychadena perplicata Laurent, 1964, *Publ. Cult. Comp. Diam. Angola*, **67**: 136, fig. 36: Alto Chicapa, Angola.

Distance from nostril to snout tip subequal to internarial distance, less than distance from nostril to eye. Outer metatarsal tubercle present, no tubercles under fourth metatarsal. 3 phalanges of fourth toe free of web, 2 phalanges of fifth toe free.

Dorsal skin folds very prominent. Dorsolateral folds extending on to thigh, five folds on tibia, at least two running entire length.

Light vertebral band present, posterior face of thigh with conspicuous, continuous light and dark bands. Lower jaw marbled.

Range. Known only from the type locality in Angola.

16. *Ptychadena mossambica* (Peters)

Rana mossambica Peters, 1854, *Ber. Akad. Wiss. Berlin*: 626: Tete; Boror; Cabaceira; Quelimane, Mozambique; Schmidt & Inger, 1959: fig. 38.

Rana vernayi FitzSimons, 1932, *Ann. Transv. Mus.*, **15**: 39: Metsimaklaba River, Botswana.

Ptychadena vernayi (FitzSimons), Poynton, 1964a: 135, fig. 72; Wager, 1965: 160.

Ptychadena mossambica (Peters), Stewart, 1967: 85, fig. 34.

The taxonomy of this species is discussed by Poynton (1969).

Distance from nostril to snout tip less than internarial distance, less or equal to distance from nostril to eye. Gular pouch slits oblique to mandible. Outer metatarsal tubercle feebly to well developed, row of tubercles present under fourth metatarsal. $2\frac{3}{4}$ to 3 phalanges of fourth toe free of web, 1 phalanx of fifth toe free. Length of foot less than length of tibia, typically less than $\frac{1}{2}$ length of body.

Paravertebral folds typically do not reach tip of urostyle, but are replaced by a paraurostyler pair, although frequently the paravertebral fold of one side is continuous with the para-urostyler fold.

Usually a light dorsal band from snout tip to vent present, but sometimes absent. Irregular longitudinal light line on upper surface of tibia occasionally present. Posterior face of thigh mottled to showing irregular light longitudinal bands. Lower jaw marbled or barred, not uniformly darkened.

Note. The short foot and squat body normally distinguish this species from *guibei*, but some individuals show the same overall body proportions as *guibei*, and can barely be separated on the more marbled or barred lower jaw and less regular banding of the thighs. It seems likely that some populations of the two species have hybridized.

Range. Northern Zululand, eastern and northern Transvaal and Botswana, Caprivi area, Rhodesia, Zambia, Malawi, Mozambique, Tanganyika, Kenya.

17. *Ptychadena floweri* (Boulenger) and *Pt. frontalis* Laurent

Rana floweri Boulenger, 1917, *Ann. Mag. nat. Hist.*, (8) 20: 417: Rosaires, Sudan.

Abrana cottii Parker, 1931, *Proc. zool. Soc. Lond.*: 898: Charre, Mozambique.

Ptychadena floweri (Boulenger), Poynton, 1964a: 136, fig. 73; Stewart, 1967: fig. 35.

Ptychadena frontalis Laurent, 1954, *Ann. Mus. Roy. Congo Belge*, 34: 26, p. 4, fig. 8, pl. 5, fig. 2: Kiambi, Tanganika, Congo.

Rana frontalis (Laurent), Schmidt & Inger, 1959: 68, fig. 35.

The taxonomy of these species is discussed in the Introduction.

Distance from nostril to snout tip less than internarial distance, less than distance from nostril to eye. Gular pouch slits oblique, intermediate or parallel to mandible. Outer metatarsal tubercle and tubercles under fourth metatarsal present or absent. 2 to almost 3 phalanges of fourth toe free of web, one or less of fifth toe free. Length of foot less than length of tibia, less than half length of body.

No light lines on back or on upper surface of tibia. Posterior face of thigh mottled, or with irregular light longitudinal stripes. Lower jaw marbled.

Range. Mozambique, Malawi, Tanganyika, west to eastern Congo and Katanga, Kenya, Sudan, Egypt.

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